

The AMC RDEC Federation

Supporting Future Combat Systems and Beyond



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17 May 2001
Simulation Based Acquisition Conference

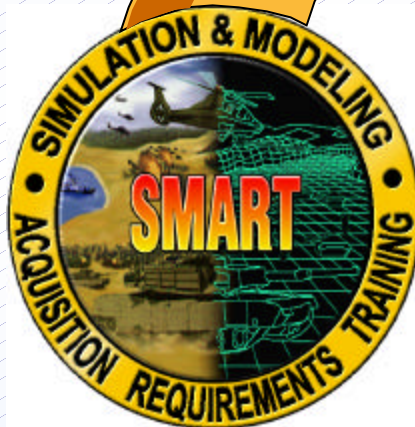


The Army's SMART Initiative: *Simulation & Modeling for Acquisition, Requirements & Training*



SBA Vision

“an acquisition process in which DoD and Industry are enabled by robust, collaborative use of simulation technology that is integrated across acquisition phases and programs.”



The Army's vision for SMART is a process by which we capitalize on Modeling and Simulation (M&S) technology to address the issue of system development and life-cycle costs through the combined efforts of the requirements, training, and acquisition communities.



SMART: Integrating Across Modeling & Simulation Domains

**Phase 0
Concept
Exploration**

**Phase I
Program Definition
& Risk Reduction**

**Phase II
Engineering &
Manufacturing
Development**

**Phase III
Production Fielding
Deployment &
Operation Support**

COMMON SYNTHETIC ENVIRONMENT

ACR

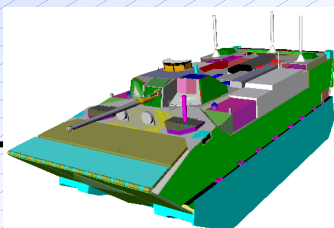
RDA

TEMO



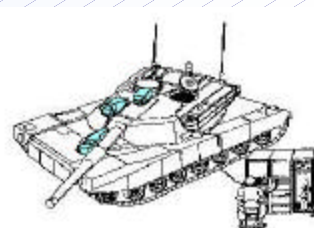
**Model-Based
Concept
Exploration**

Seamless
Data Flow



**Simulation-Based
Design**

Seamless
Data Flow

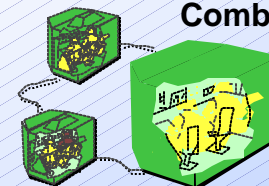


**Virtual Proving Ground
Live Tests/Experiments**

Seamless
Data Flow



**Next GEN
Combat Systems**



Combat Mission Trainer

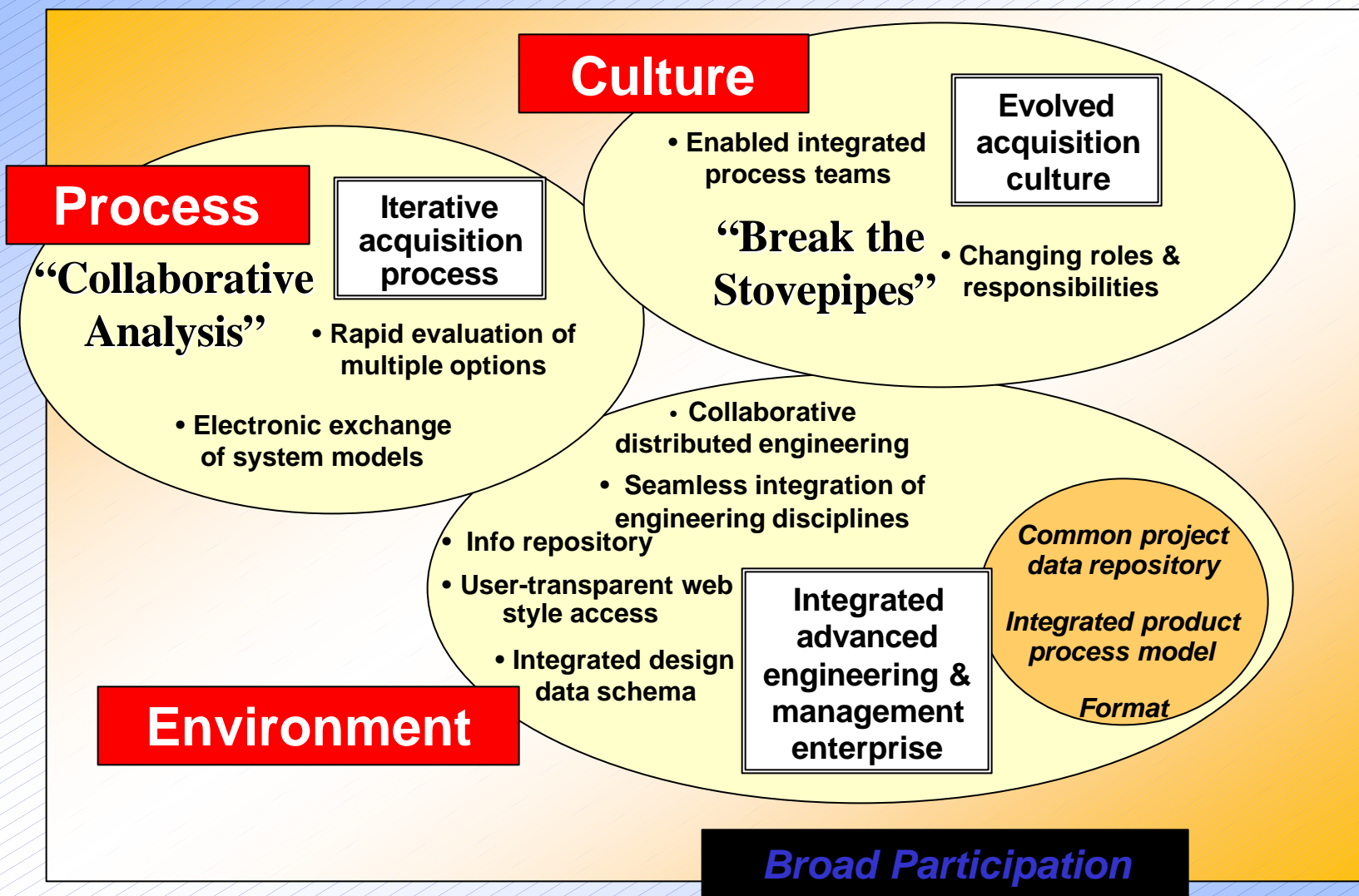
**Integrated
SMART Tools**

**Reduced Risk, Lower Cost,
Shorter Development Life-Cycle**

From Concept Exploration Through Deployment

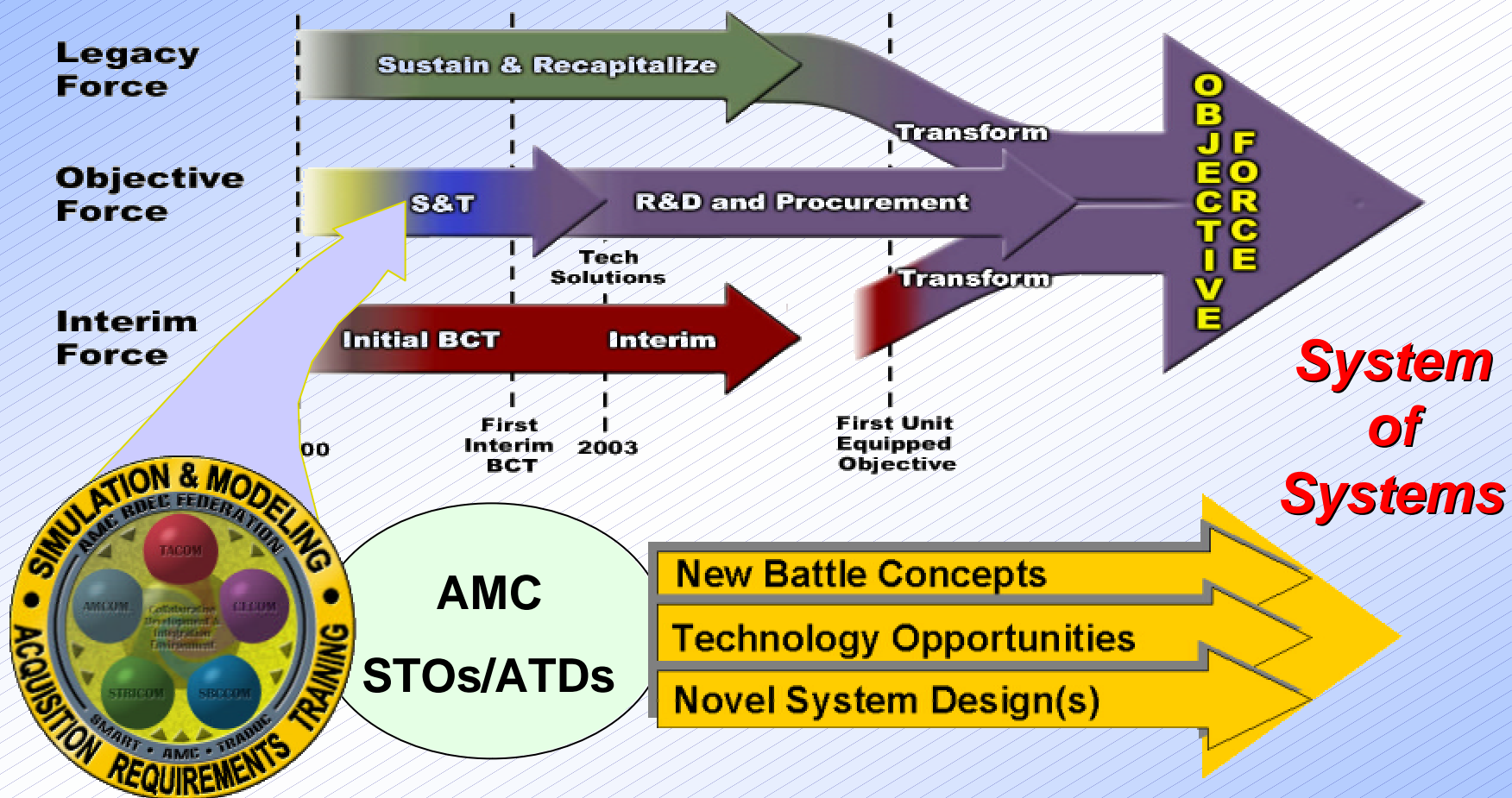


*SBA & SMART are **much more** than just technology*





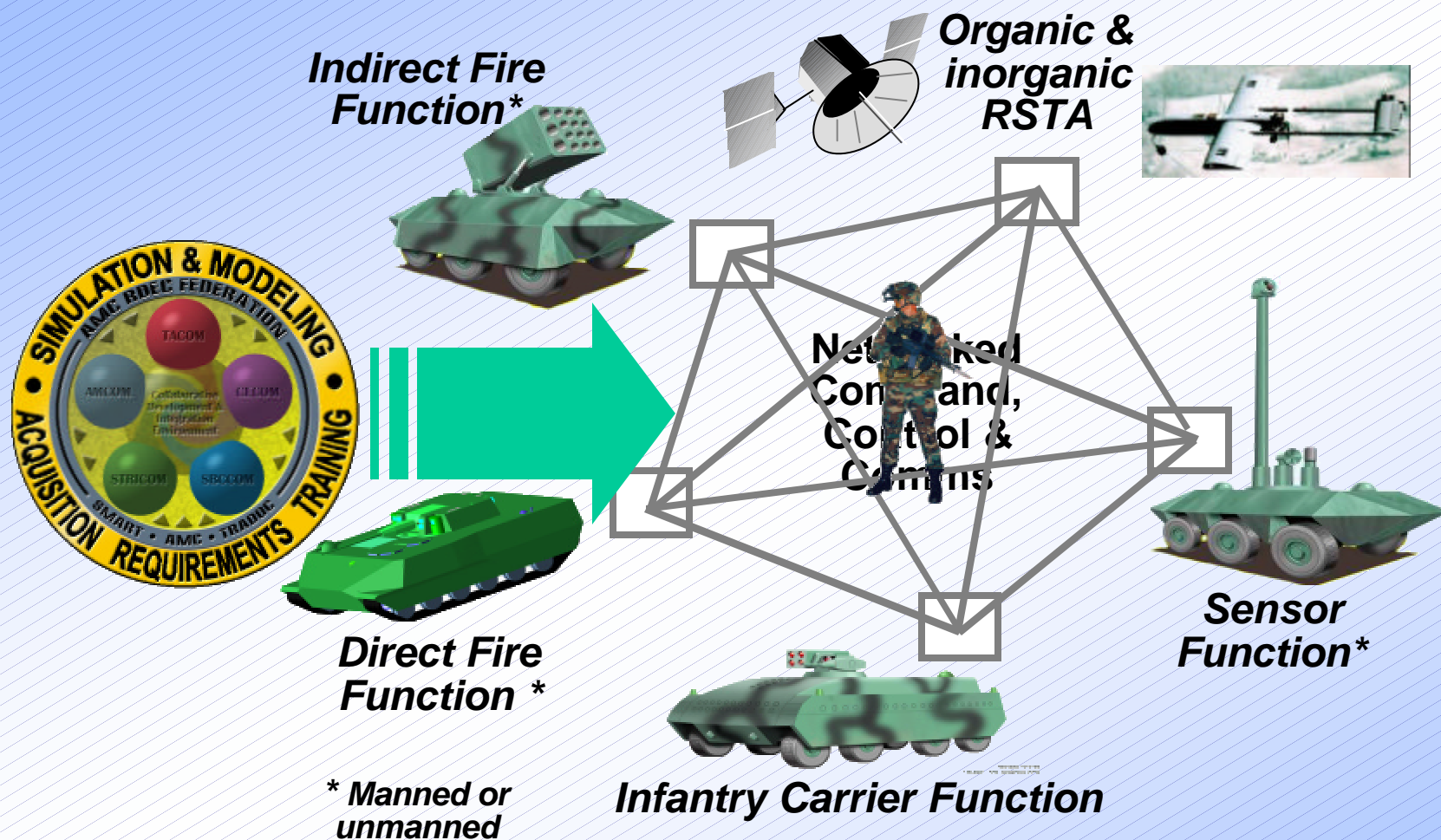
The Army Transformation



... The Army is transforming itself and M&S will play an important role



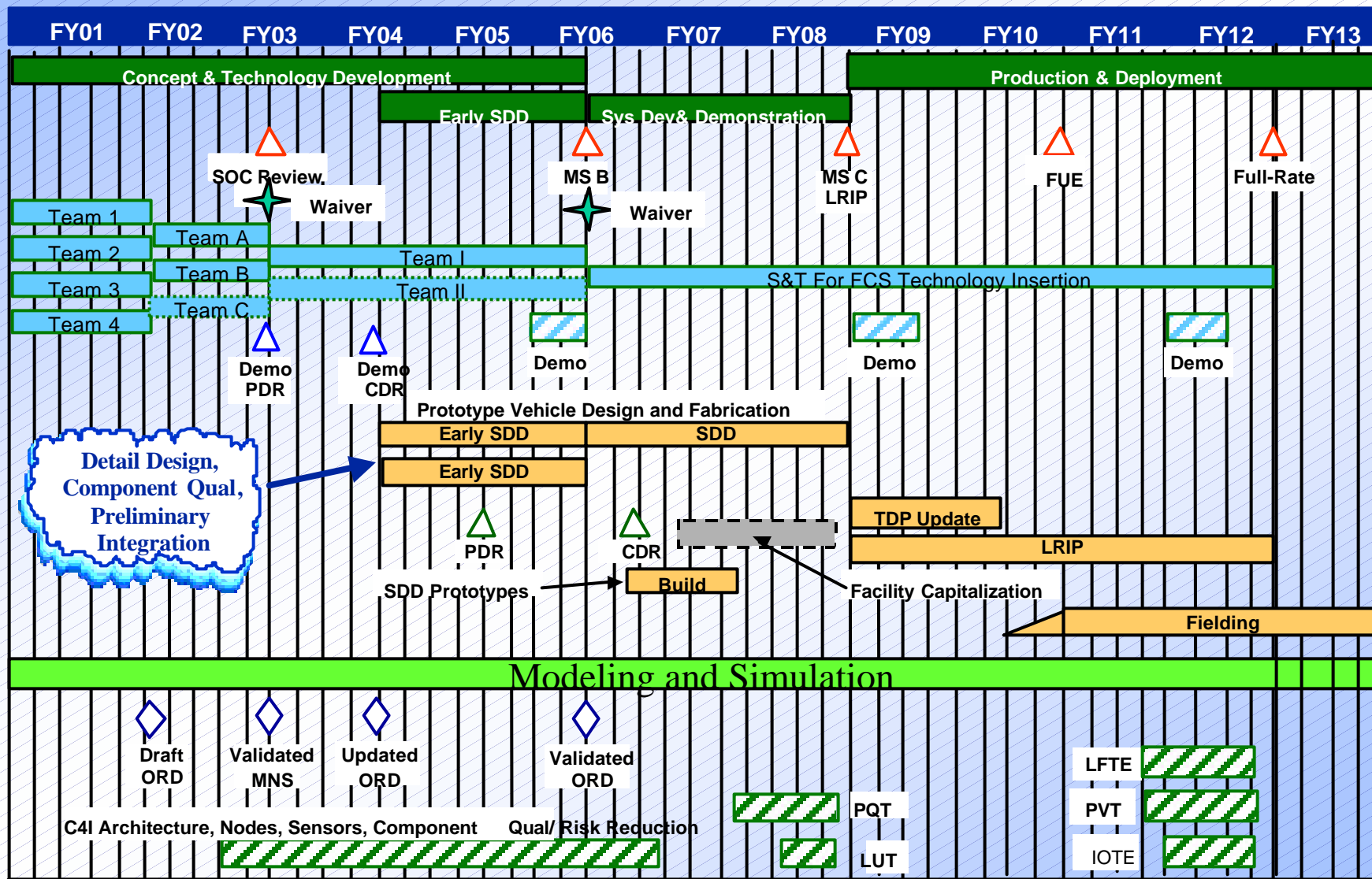
Future Combat System: Enabling the Objective Force



Complex, Information-based System of Systems

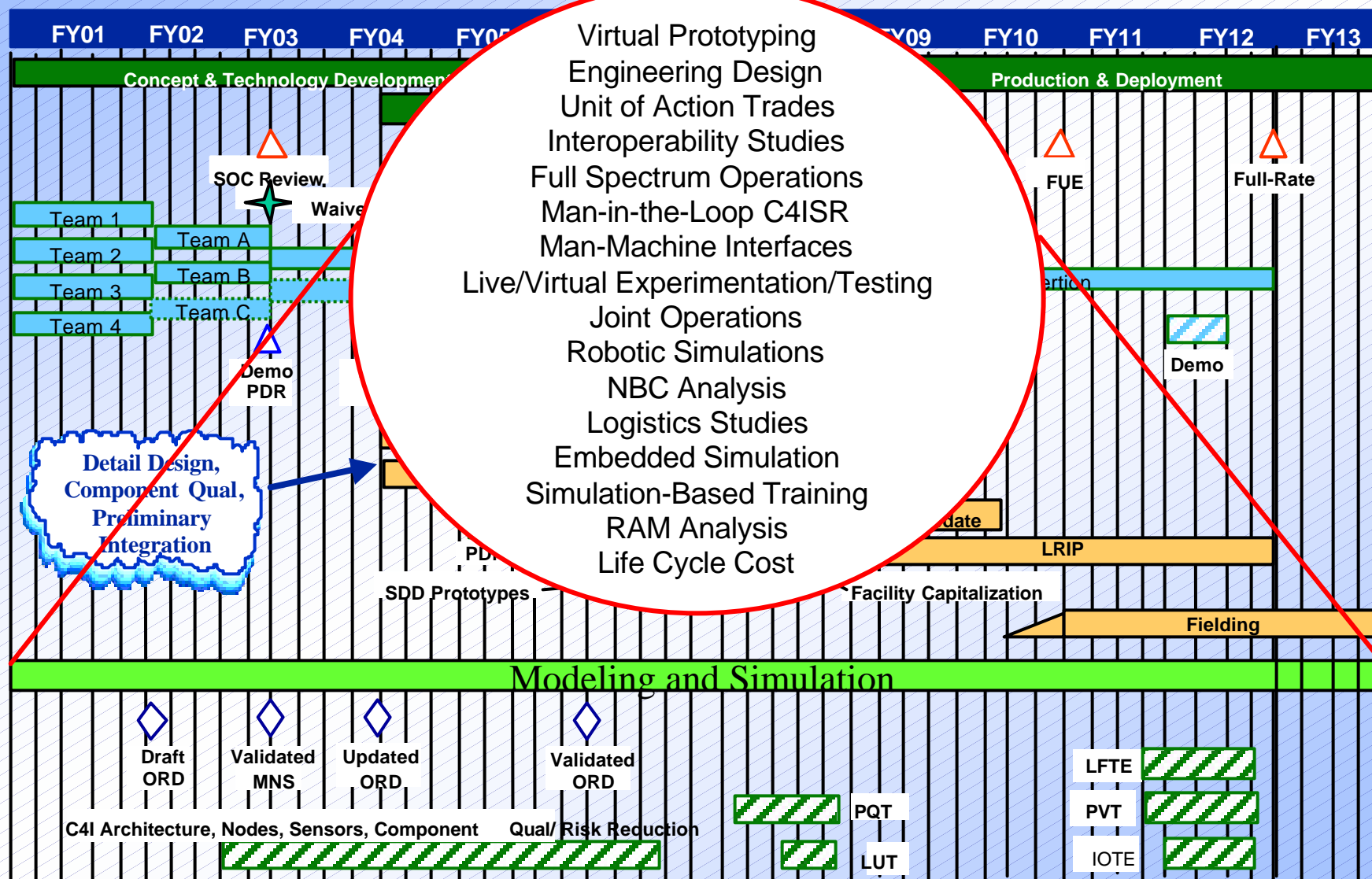


Current Draft FCS Schedule





What's in that Modeling & Simulation bar?





AMC RDEC Federation Vision

- To develop an AMC-wide distributed modeling and simulation environment that will permit the overall research, development and acquisition community to have wide access, linkage, and integrated use of a diverse set of models and simulators available at each of the federation partner laboratories/facilities.
- To provide a capability for representing and evaluating, through distributed modeling and simulation, a wide range of technologies, military systems, mission equipment, and battle space capabilities.
- To provide a capability for addressing issues from both an individual platform and system-of-systems perspective for the optimal development, integration, and evolution of information, communication, mission equipment, weapon systems, and platform technologies.



What is a Federation? – the new culture...

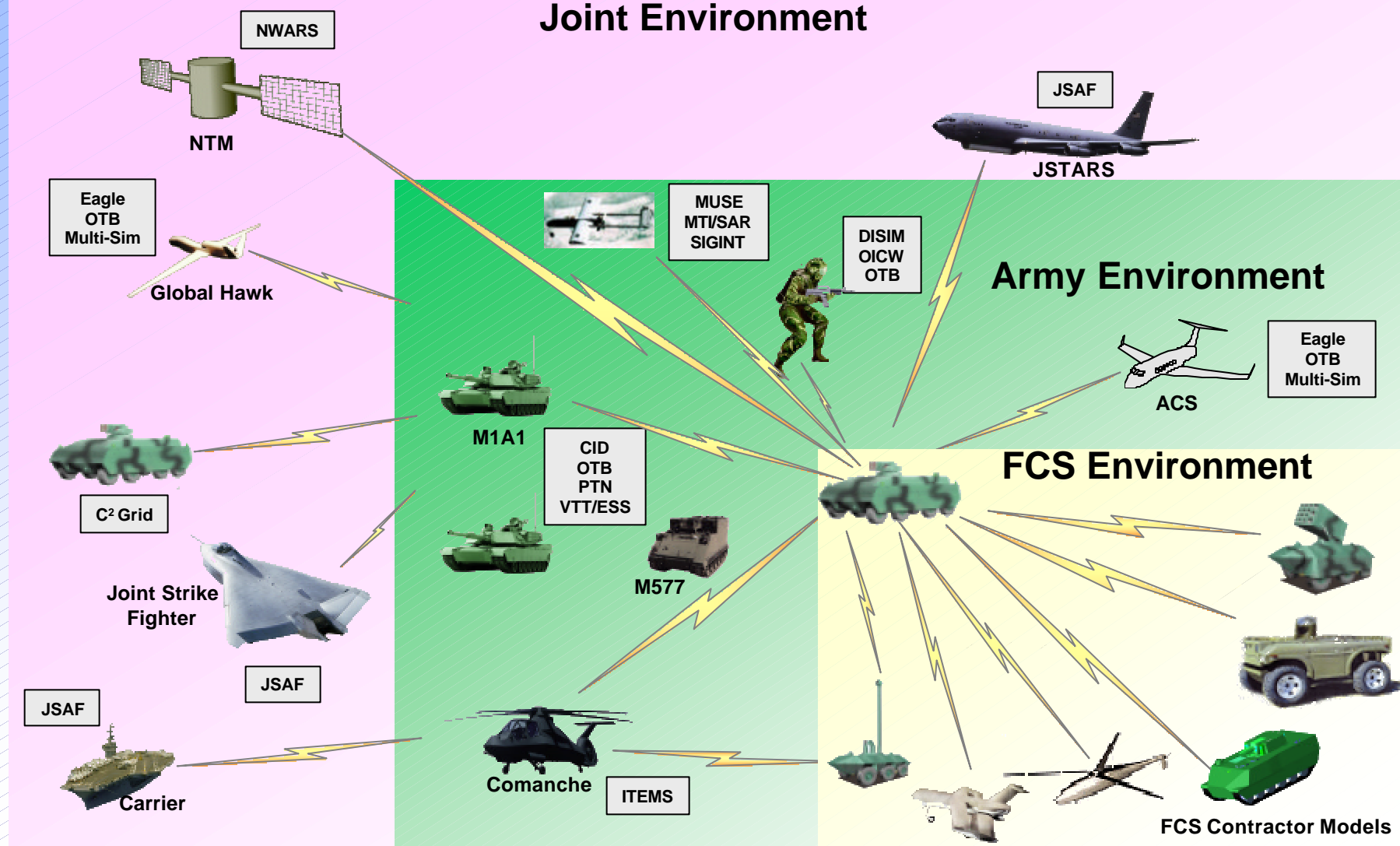
People working together toward a common objective...





Common Objective: *simulate & experiment as we fight*

Joint Environment





AMC RDEC Federation *core competencies*

Organizations

M&S used

Functions



AMRDEC



SBCCOM



ARDEC



CECOM/
NVESD



Army Research
Laboratory



STRICOM



TARDEC



CERDEC/
Monmouth



COE ERDC

IDEEAS

NGPM

Vulnerability Server

MP-ERM

DIFM

CBPOP

DI-Sim

APS Server

Missile Server

HLASIM

STRIVE/ITEMS

ATCOM

Urban Sprawl Server

FlightLab

TIM/IUGS/SAR/ISAT

NRMM

OneSAF TestBed

JSAF/ModSAF/DISAF

Hi-Res Terrain

Paint the Night/NVTHERM

C4I Stimulation Tools

Reconfigurable Simulators

Data Analysis Tools

FIRESIM

Stealth

HLA

Engineering Performance

Component Models

6-DOF and Flight Models

Interior Geometry

Urban

Robotics

Human Factors

Sensors/Targeting/Timelines

Munitions/Lethality/Survivability

Brigade & Below SA/C4ISR &
EAB/Joint Connectivity

Force-on-Force

Soldier-in-the-Loop

Logistics

Sustainment/Deployability

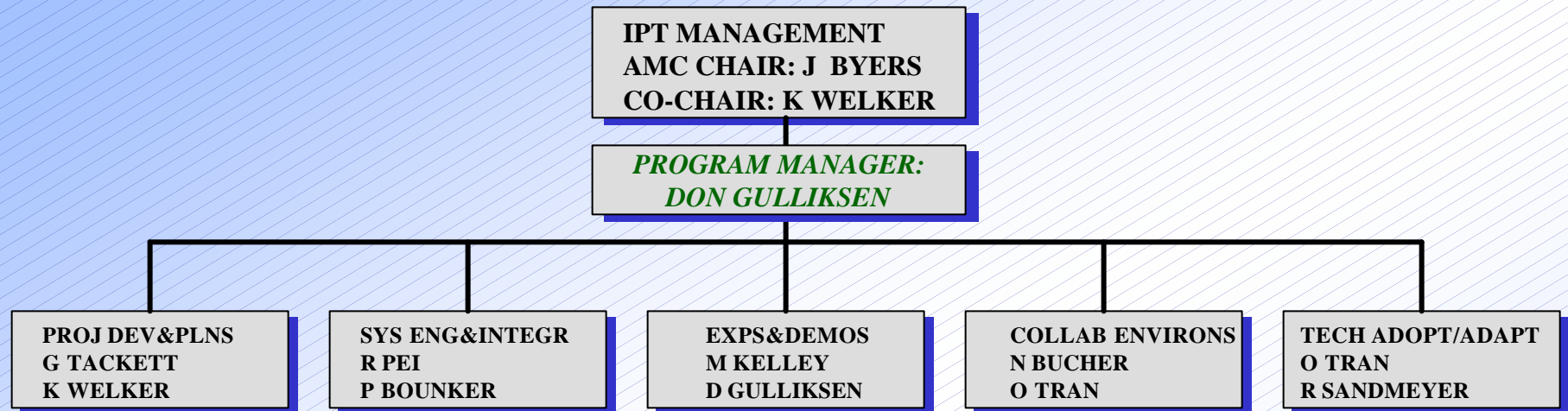
Weather/Obscurants

Mobility

Dismounted Soldiers



AMC RDEC Federation *operational assignments*



- *Looks like an org chart*
- *Smells like an org chart*
- *Isn't an org chart*
- *It's a new culture...*

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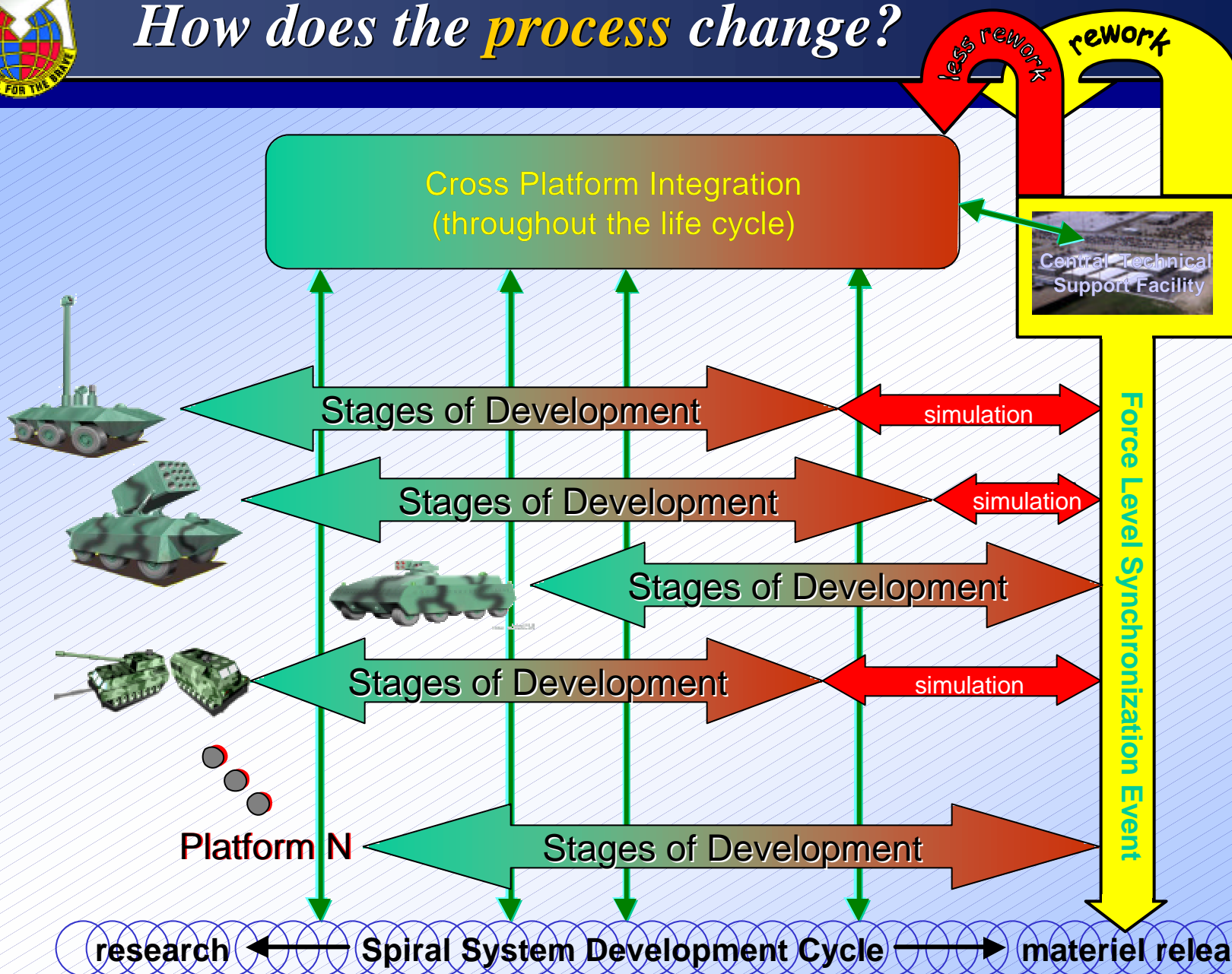
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How does the *process* change?





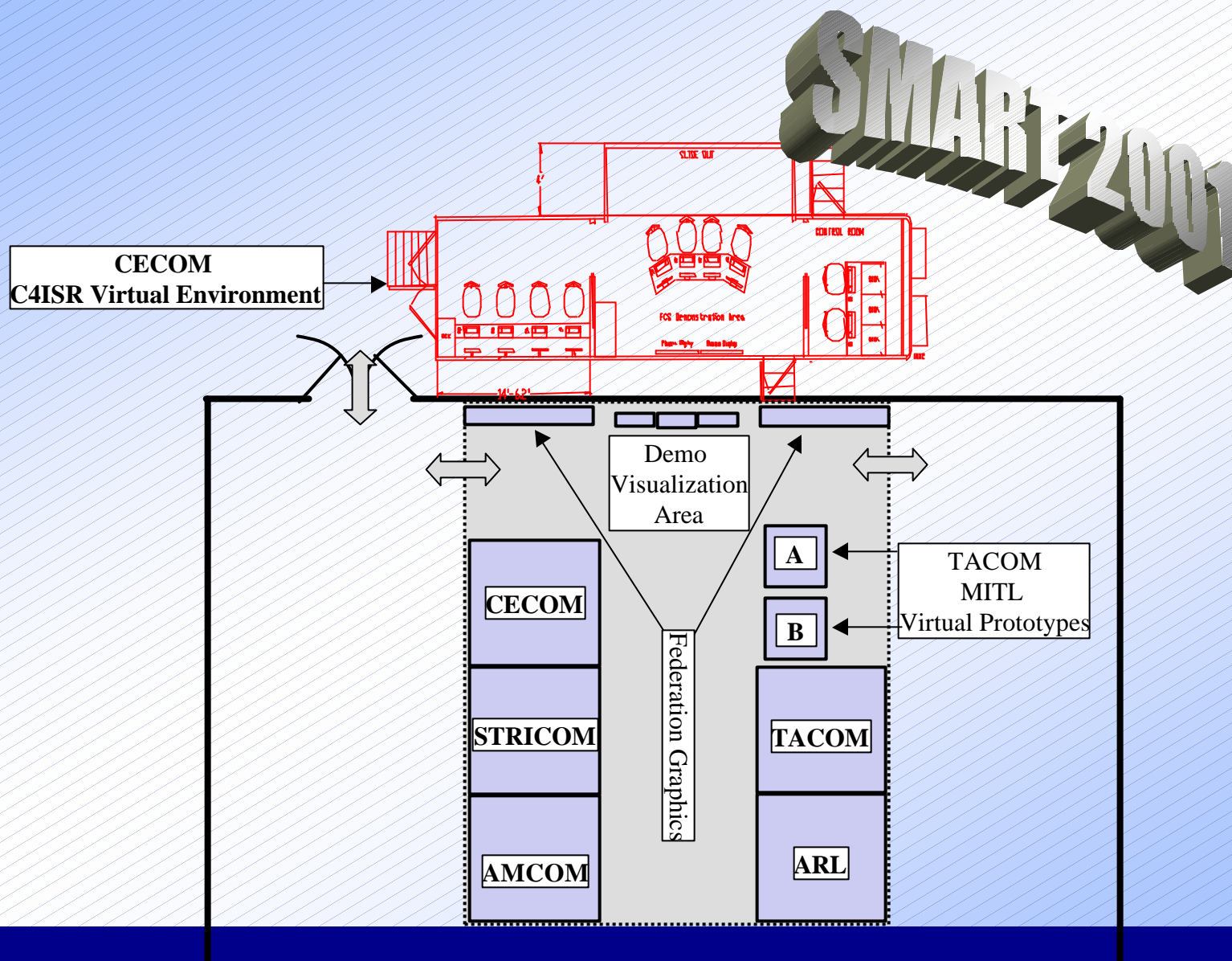
*What are the characteristics of the **environment**?*

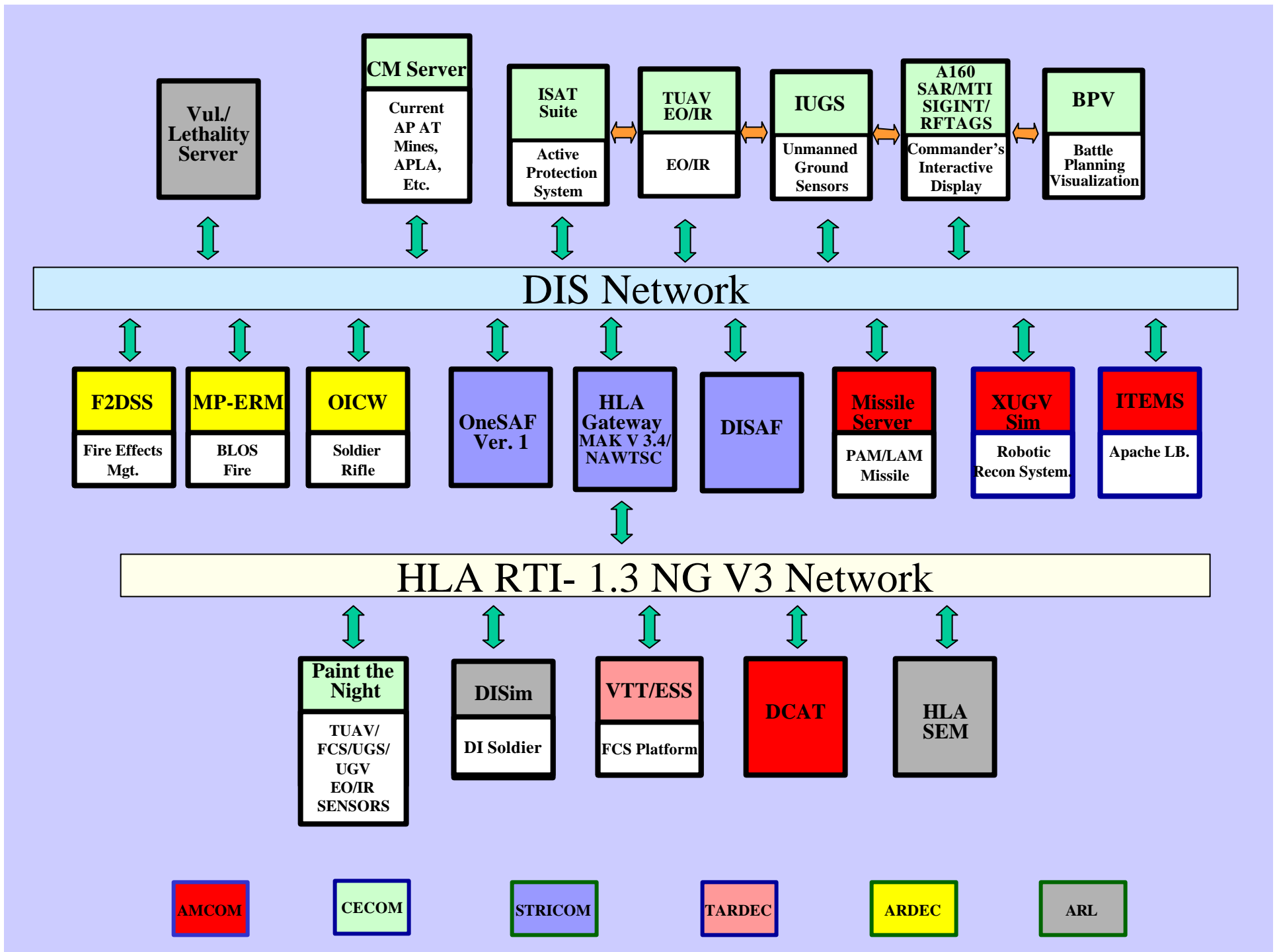
- A digital environment for developers and users which is:
 - virtual
 - low cost and reusable
 - participative and distributed
 - available throughout the life cycle
- A standard architecture which permits:
 - combinations of models, simulators and platforms
 - distributed plug and play connections
 - backward compatibility
- A common synthetic environment providing:
 - consistent terrain
 - joint exercises across organizations/Services



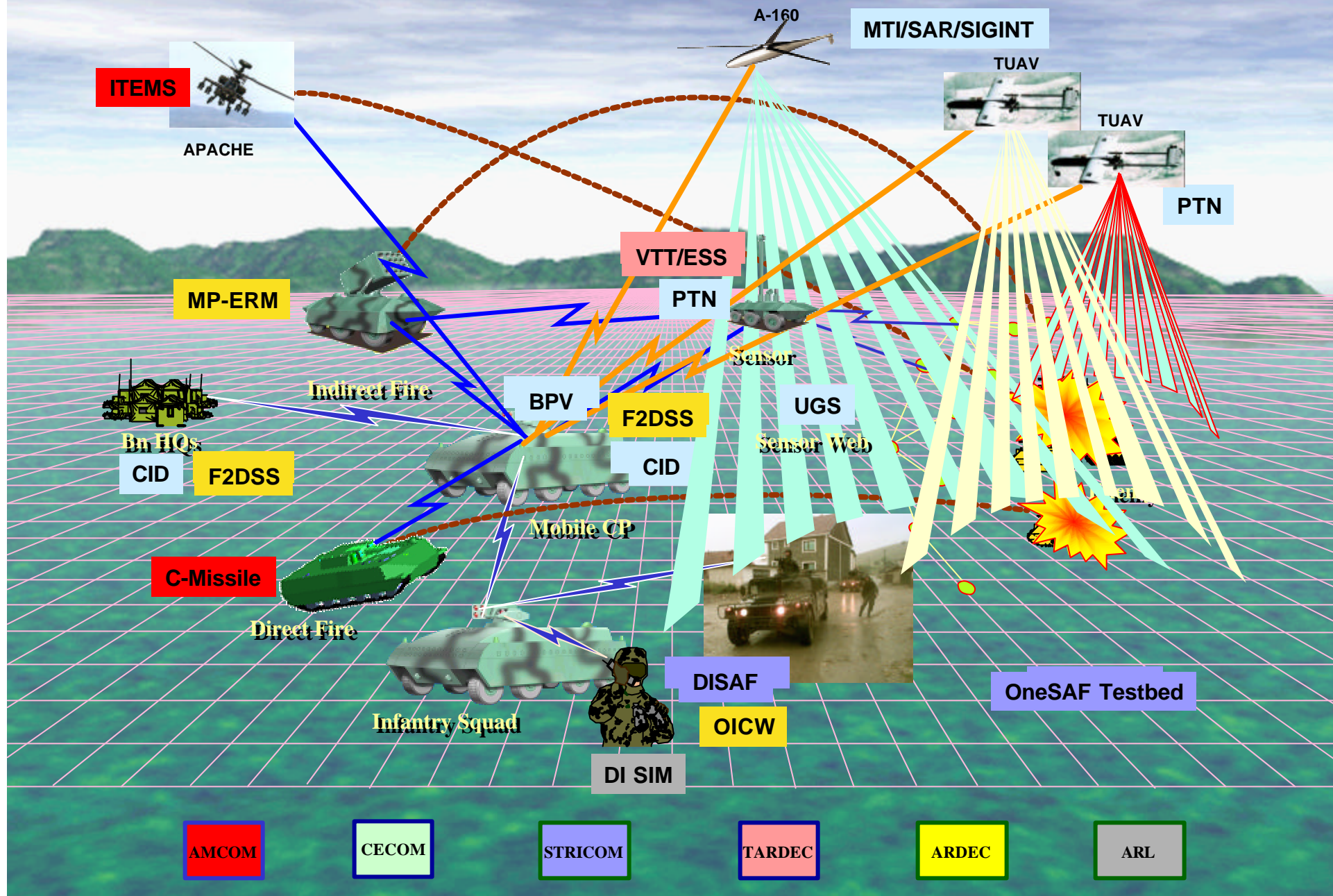


AMC RDEC Federation: *First Experiment*





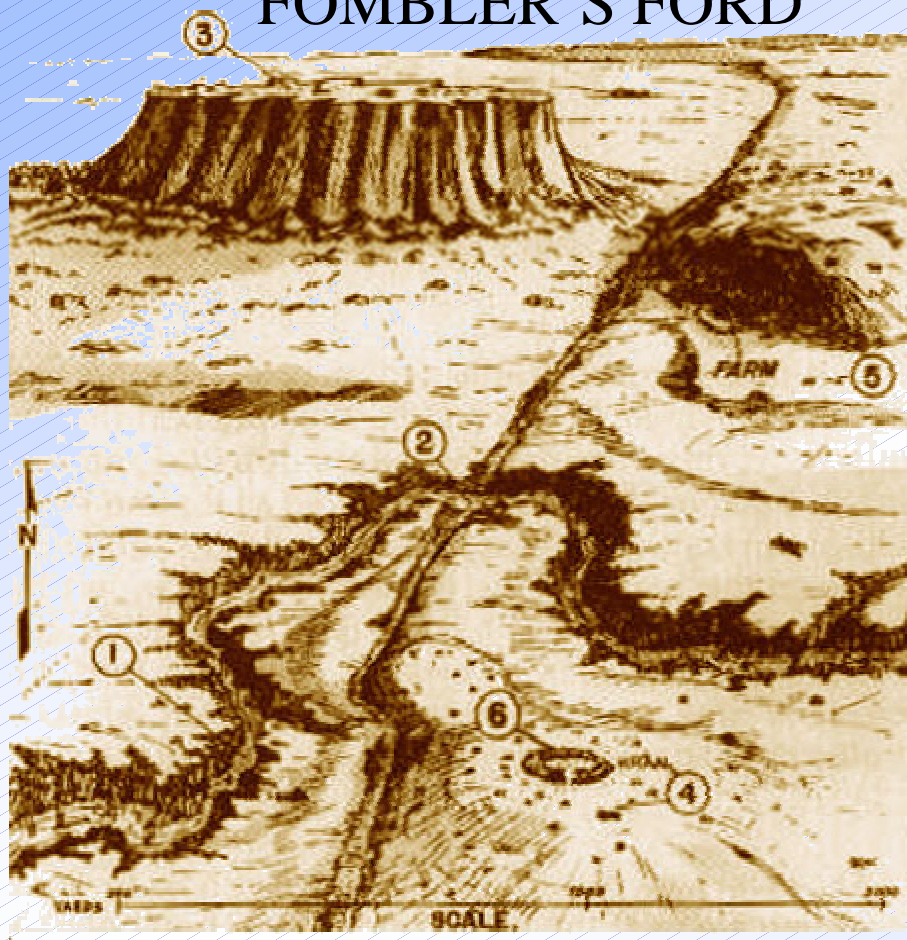
AMC RDEC Federation - An FCS Integration Environment





FOMBLER'S FORD

FOMBLER'S FORD

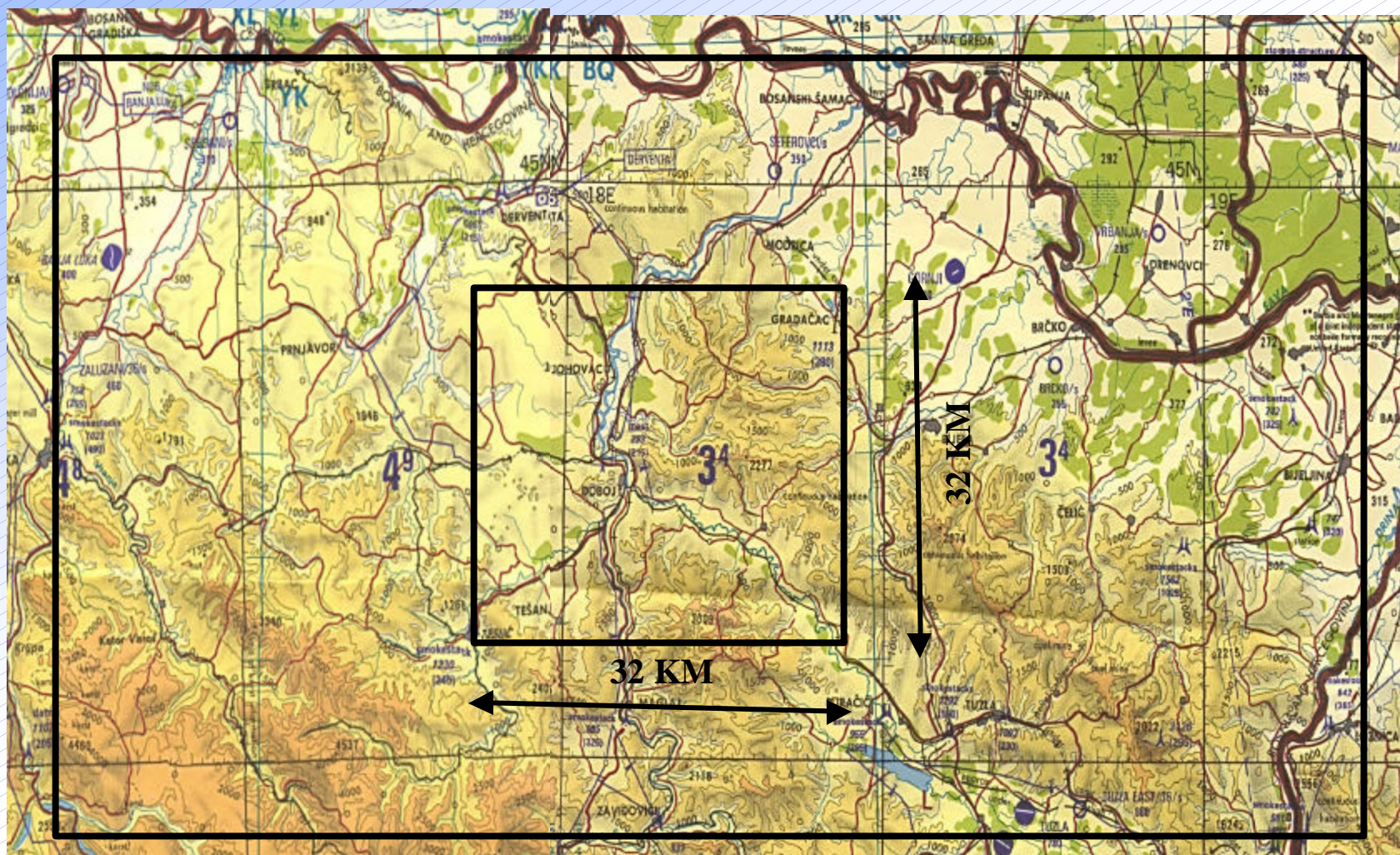


- Ogenchornya River
- Ford
- Nichevo Mountain
- Dobroy Hill
- Starry Hill
- Dobroy Village

Fomblers Ford depicts four dreams in which a platoon of the Combined Arms Battle Team protects the Ford in a defensive position. While in the defense, the platoon incurs four dreams with which it engages the enemy. The first dream presents six Panslav IV as the advance guard of an enemy tank battalion approaching the Ford. The second dream describes three enemy ATGMs on a hillside above a suspected enemy strong point. The third dream depicts two Enemy assault squads approaching the CP from the south via the Ogenchornya River. The fourth dream describes a multiple event in which four enemy helos approach the Ford while three flat bed trucks loaded with refugees and six possible guerillas approach a road block near Dobroy Hill.



Northeast Bosnia Terrain



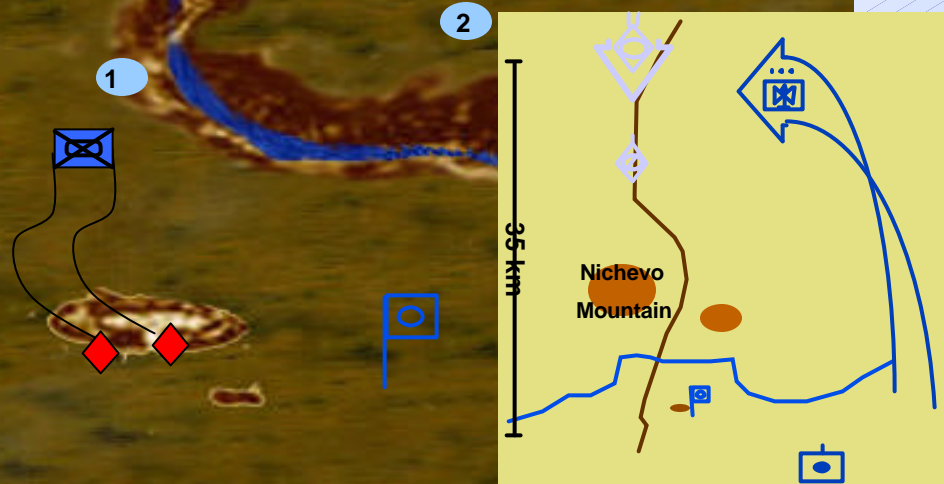


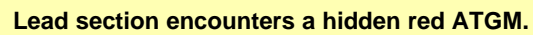
1

2

Battalion commander times the platoons attack on the Panslavs to coincide with a deep attack by Divarty and Apache Longbows on the enemy battalions main body.

2





ATGMs

Enemy ATGM launches missile.

**APS detects flash. Reports enemy location
On network. RRS slews radar on target and
fires missile to destroy ATGM projectile.**

Targeting data computed on other RRS and sent to Manned Combat Vehicles. CV plots target and presents option to Cdr to fire back. Cdr toggles "fire" switch to destroy ATGM. Each vehicle scans vicinity for glints using a netted low power laser, find both remaining ATGM, fire missiles to destroy them.



3rd Dream – night perimeter infiltration

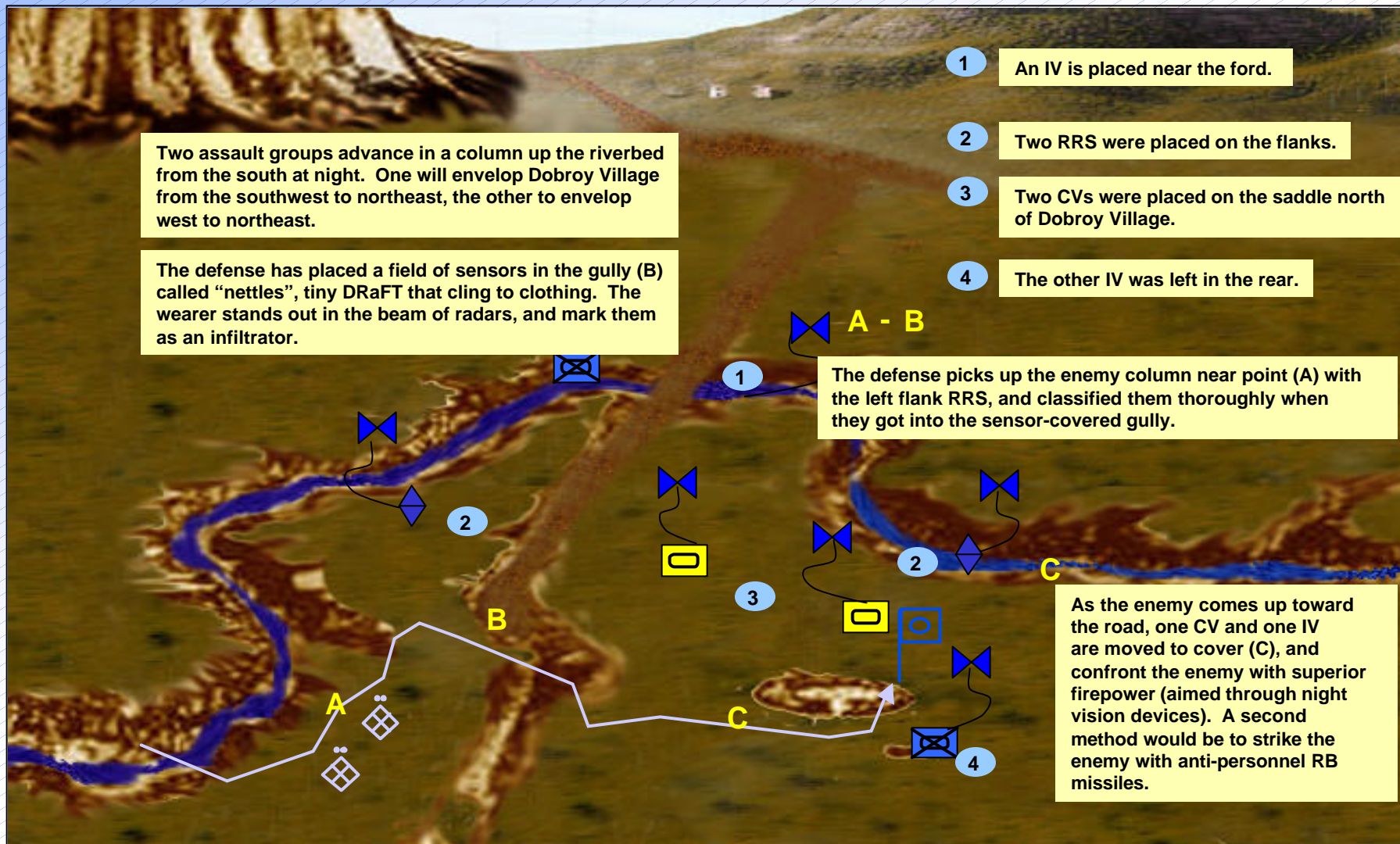
Two assault groups advance in a column up the riverbed from the south at night. One will envelop Dobroy Village from the southwest to northeast, the other to envelop west to northeast.

The defense has placed a field of sensors in the gully (B) called “nettles”, tiny DRaFT that cling to clothing. The wearer stands out in the beam of radars, and mark them as an infiltrator.

- 1 An IV is placed near the ford.
- 2 Two RRS were placed on the flanks.
- 3 Two CVs were placed on the saddle north of Dobroy Village.
- 4 The other IV was left in the rear.

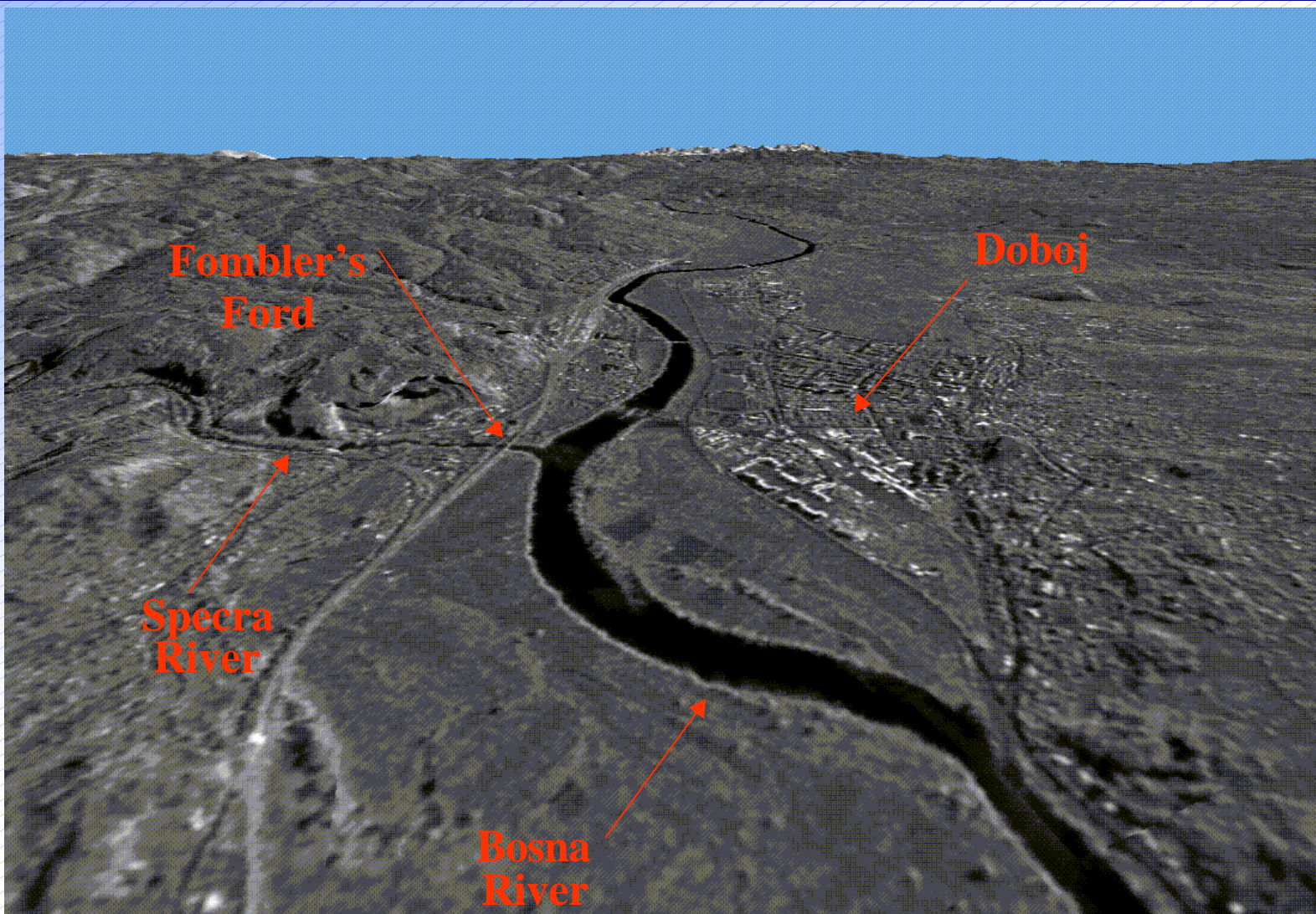
The defense picks up the enemy column near point (A) with the left flank RRS, and classified them thoroughly when they got into the sensor-covered gully.

As the enemy comes up toward the road, one CV and one IV are moved to cover (C), and confront the enemy with superior firepower (aimed through night vision devices). A second method would be to strike the enemy with anti-personnel RB missiles.





Battlefield Planning Visualization Imagery





Key: Create the Sandbox

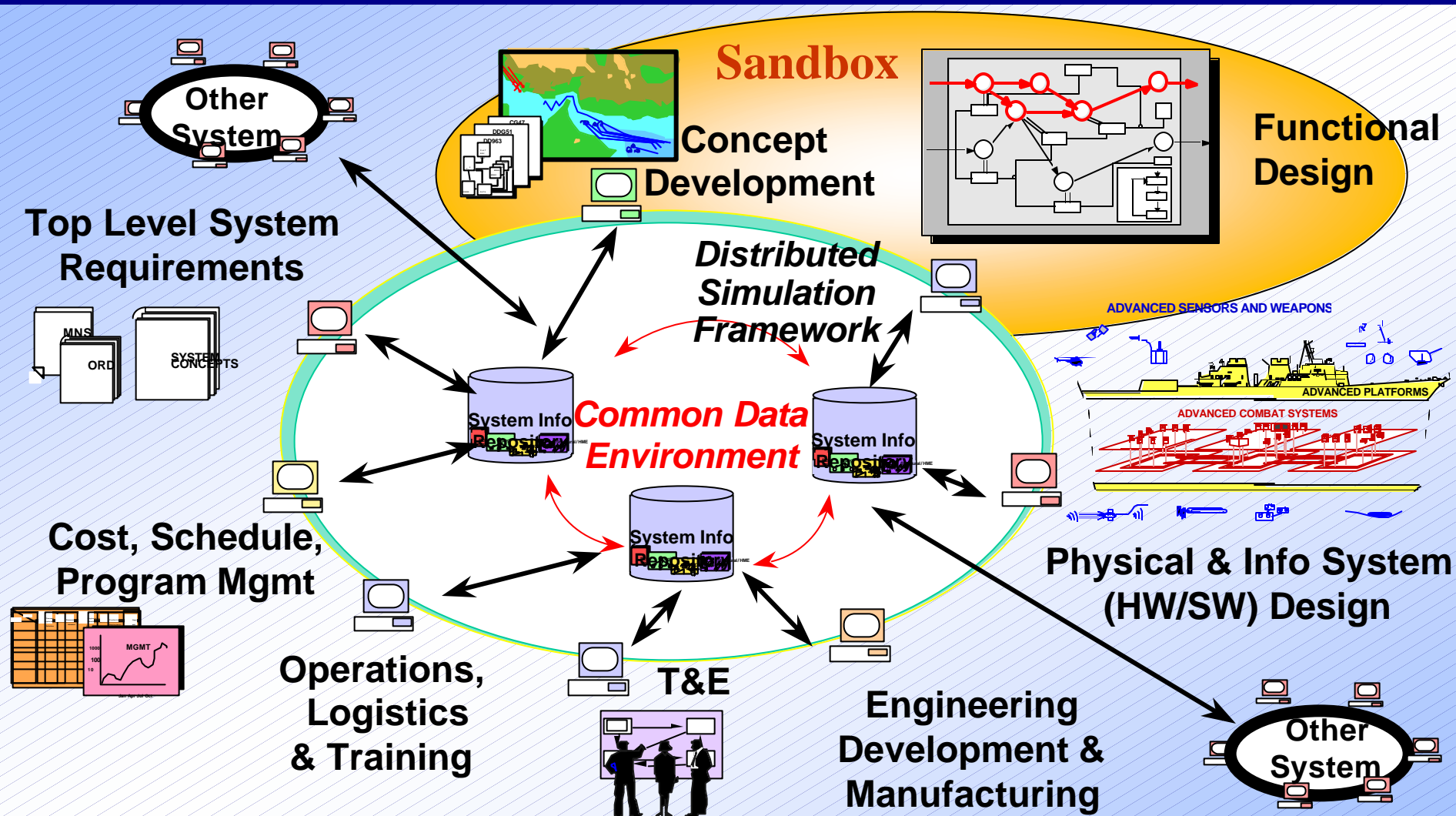
- Create a distributed, collaborative engineering environment:
 - A “common sandbox”
 - Everyone gets to play
 - Rules are set by Mother
- Serves cross-cutting needs:
 - Materiel development community
 - Labs/Arsenals
 - Contractors
 - Combat development community
 - Branch schools, CAC, etc.
 - CONOPS & TTP development
 - Joint community access



<sandbox – version 1.0>



Illustration of the SBA Paradigm



Extensive re-use across all acquisition phases & programs



The Goal: A Virtual Army Research, Development and Engineering Community

[<http://www.sandbox.army.mil>](http://www.sandbox.army.mil)

Edit

Topology

Assets

Logistics



Roads

Buildings



Floors

Material



[Hyperlink to worldwide satellite imagery](#)

[Hyperlink to validated model](#)

Blue Assets

Vehicles

Armaments

Missiles

Aircraft

Communications

Command&Control

Intelligence

Soldiers



Press to select satellite imagery

Mortars

Artillery

Mines



Self Propelled

Towed

Robotic



Red Assets

Vehicles

Armaments

Missiles

Aircraft

Communications

Command&Control

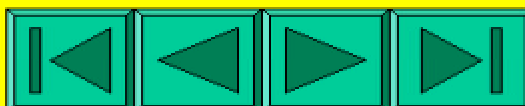
Intelligence

Soldiers



Open
Scenario
Archives

Scenario Action Control



Activate
Whiteboard
Stylus





*Lesson: This isn't a static **environment**...*



- M&S framework must live and evolve with the system
 - Constructive migrates to virtual
 - Sensors may remain constructive until built/tested
 - Mockups/virtual migrates to demonstrator
 - Brassboard to hardware
 - Combo of live/virtual/constructive
 - Training system is planned outgrowth of virtual
 - Live/virtual testing yields training approaches



*Lesson: Nobody wants to buy the **infrastructure***





Lesson: we all have some work to do...

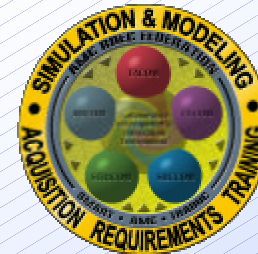
- ☐ Early development of models
 - ☐ Model reuse from top to bottom
 - ☐ Model reuse from start to finish

- ☐ Development of standards

- ☐ Adherence to standards

- ☐ Wiring together existing resources

- models
- simulators
- trainers
- labs



- ☐ Working horizontally across:

- Developers
- Customers
- Contractors

